Federal Circuit No. 2012-1172

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

Apeldyn Corporation,

Plaintiff-Appellant,

v.

AU Optronics Corporation and AU Optronics Corporation America,

Defendants-Appellees,

and

Chi Mei Optoelectronics Corporation and Chi Mei Optoelectronics USA,

Defendants-Appellees

and

Samsung Electronics Co. Ltd. and Samsung Electronics America, Inc.,

Defendants.

On Appeal from United States District Court for the District of Delaware in case no. 08-CV-0568, Judge Sue L. Robinson

Brief for Defendants-Appellees AU Optronics Corporation and AU Optronics Corporation America

[NONCONFIDENTIAL]

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December 5, 2012

CERTIFICATE OF INTEREST

Counsel for Defendant-Appellees AU Optronics Corporation and AU Optronics Corporation America certifies that:

1. The full name of every party or amicus represented by me is:
AU Optronics Corporation and AU Optronics Corporation America

2. The name of the real party in interest is: N/A

3. The names of all law firms and the partners or associates that appeared for the party or amicus now represented by me in the trial court or agency or are expected to appear in this court are:

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Dated: December 5, 2012

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CONFIDENTIAL MATERIAL OMITTED

The material omitted on pages 13, 15-19, 25, 28, 51 describes details of the operation of the Defendants-Appellees' accused devices. The information was designated confidential by the Defendants-Appellees under the terms of a Protective Order issued by the District Court in this case.

TABLE OF AUTHORITIES

Page(s)

CASES

TABLE OF ABBREVIATIONS[1]

'382 patent	U.S. Patent No. 5,347,382, issued Sept. including claims 22-29 of the Reexamination Certificate
ABr.	Confidential Brief of Plaintiff-Appellant Apeldyn Corporation, dated Sept. 21, 2012
ac	Alternating current
AUO	Defendant-Appellees AU Optronics Corporation and AU Optronics Corporation America
CMO	Defendant-Appellees Chi Mei Optoelectronics Corp. and Chi Mei Optoelectronics USA Inc.
ITO	Indium Tin Oxide
LCD	Liquid crystal display
RGB	Red, Green, Blue
RMS	Root mean squared
TFT	Thin film transistor

[1] Unless otherwise noted, any emphasis in quoted text has been added in this brief.

STATEMENT OF RELATED CASES

AUO agrees with the statement of related cases provided by Apeldyn.

STATEMENT OF JURISDICTION

AUO agrees that this Court has jurisdiction over this appeal, as stated in Apeldyn's brief.

STATEMENT OF THE ISSUES

Apeldyn's statement of the issues fails to focus on the particular claim construction and infringement issues that were decided against Apeldyn on summary judgment. The following is an accurate statement of the issues that need to be addressed by this Court:

1. Did the district court correctly construe the asserted claims of the '382 patent as requiring that the retardance be changed by changing a signal that is supplied to the retarder, not merely by changing the voltage differential across the electrodes?

2. Did the district court correctly hold that there was insufficient evidence to show that the claims of the '382 patent are infringed, literally or under the doctrine of equivalents, when Apeldyn failed to show that the accused products have a signal that is supplied to the retarder and that changes the retardance by changing from a first amplitude, to a second amplitude and then to a third amplitude?

Apeldyn limits its arguments to claims 1, 10, 11 and 20 of the '382 patent and ignores the remaining claims (2-6 and 22-29) that were asserted below. The

district court correctly found that ***none*** of the asserted claims is infringed, and the district court's reasoning applies in the same way to each of the asserted claims. AUO therefore addresses ***all*** of the asserted claims, regardless of whether they are addressed in Apeldyn's brief.

STATEMENT OF THE CASE

Apeldyn brought suit against AUO and other defendants alleging that their LCD panels infringe the '382 patent. After completion of fact discovery, AUO and CMO each filed motions for summary judgment of noninfringement. JA2245-47, 2328-31. On November 15, 2011, the district court granted CMO's motion, but denied AUO's. JA38. Both Apeldyn and AUO sought reargument, JA11266, 11336-40, and the district court granted AUO's motion and denied Apeldyn's. JA52.

The district court agreed that AUO's and CMO's products function in the same manner, and there was no dispute regarding how either defendant's products function. Based upon the undisputed functioning, Apeldyn's evidence was insufficient to present a triable issue of fact with respect to either literal infringement or the doctrine of equivalents. JA49-51 at 10-12. In particular, Apeldyn's evidence failed to identify a signal (or its equivalent) in the accused products that satisfies the asserted claims, all of which require that the retardance be changed from a first retardance to a second retardance by causing a signal that is

supplied to the retarder to change from a first amplitude (required for the first retardance) to a second amplitude (beyond that required for the second retardance) and then to a third amplitude (required for the second retardance). *Id.;* JA23; JA75 at 9:56-10:7 (claim 1), JA77 at 14:7-23 (claim 20); JA130-31 (claims 22-29).

In response to the parties' summary judgment motions, Apeldyn argued that, in the accused products, the retardance is changed by changing the voltage across the retarder electrodes, not by changing a signal that is supplied to the retarder. JA4947, JA4954; JA5467-68. The Court rejected that argument as a matter of claim construction. JA23. On reargument, Apeldyn tried to recast its infringement position, arguing that the pulsed signal from the source driver is the signal required by the claims. JA11206. But there was no expert testimony to support that new theory of infringement, and in fact, Apeldyn's expert admitted "the source driver is not the thing that is control -- is driving the -- the liquid crystal." JA7523-24. Accordingly, because Apeldyn's evidence was insufficient to present a triable infringement issue with respect to the "signal" elements of the claims, the Court correctly granted summary judgment for AUO.

STATEMENT OF FACTS

Apeldyn's statement of facts is incomplete, in some instances inaccurate, and most importantly fails to focus on the particular portions of the '382 patent,

accused products and Apeldyn's expert report that are relevant to the district court's judgment and this appeal.

Apeldyn mischaracterizes the '382 patent as solving a problem relating to big screen televisions, ABr. at 3, when in fact, the '382 patent does not teach how to individually control the millions of pixels that form an image on a large, high resolution liquid crystal display. The '382 patent teaches how to achieve faster response times when supplying a drive signal to a single liquid crystal cell retarder, such as that shown in Figures 1 and 2. *See, e.g.,* JA71 at 2:6-9. Although the patent states that such a cell can be part of an array in a liquid crystal display, JA73 at 5:16-19, the drive circuitry for such an array is not taught.

The following facts are both relevant and undisputed, and provide a complete description of the relevant aspects of the accused devices:

I. THE '382 PATENT

A. Disclosure

The '382 patent is directed to a fast response liquid crystal cell optical retarder system. JA58, Abstract; JA71 at 1:12-14. As described in the background section of the patent, the polarization of light passing through a liquid crystal cell retarder can be varied by changing the voltage that is applied to the retarder. JA71 at 1:29-33. Such retarders can be used as components of fiber optic communication systems or liquid crystal displays. JA71 at 1:33-45. If a retarder is

positioned between a pair of polarizing filters, the retarder can function as an optical shutter to control the amount of light that passes through the filters. JA71 at 1:33-38; JA7339, Abstract. An array of such retarders and filters can serve as a liquid crystal display, with each retarder corresponding to one picture element (pixel) of the display. *See* JA73 at 5:16-19. The '382 patent does not provide any specific details regarding how to drive an array of retarders in a display device.

The '382 patent aims to improve the response time of a liquid crystal cell retarder. JA71 at 1:61-2:3, 2:10-14. According to the patent, the response time can be made faster by the use of "impulse switching," *i.e.*, "the application of a voltage in excess of the voltage corresponding to the target retardance." JA71 at 2:6-9, 2:23-26. This technique involves initially applying a switching voltage higher than the voltage corresponding to the target retardance so as to cause the liquid crystal cell to move toward that target retardance at a rapid rate. When the target retardance has been reached, the applied voltage is switched to the voltage corresponding to the target retardance and maintained at that level until a new retardance is desired. JA71 at 2:16-19.

Figure 1 of the '382 patent shows a typical liquid crystal optical retarder comprising a liquid crystal cell 10 and a drive signal source 12, which supplies a relatively low voltage ac drive signal to the cell. JA72 at 3:60-63.

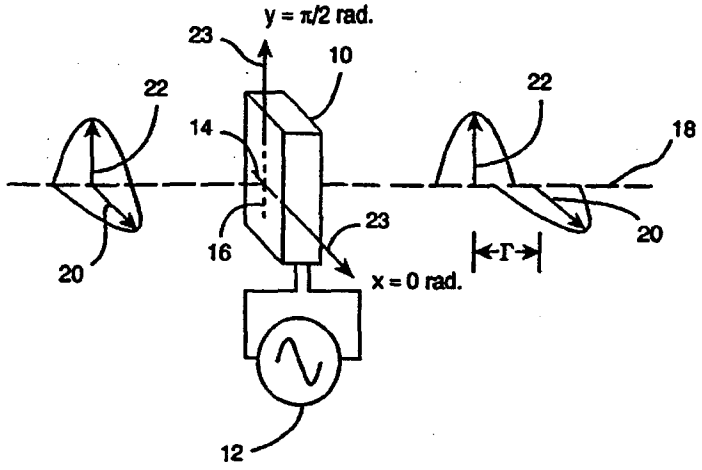

Fig. 1

As shown in Figure 1, polarized light passing through the liquid crystal cell 10 experiences a retardance Γ, which changes the polarization of the light emerging from the cell. JA72 at 4:43-49. The amount of retardance and hence the polarization of the emerging light can be controlled by controlling the amplitude of the ac signal that is supplied to the liquid crystal cell. JA72 at 4:12-21, 4:49-53; *see also* JA73 at 5:50-52 ("the retardance Γ produced by the cell is a function of the applied RMS voltage").

Figure 2 shows a cross section of a typical liquid crystal cell 11, including a pair of glass plates 24 and 26, liquid crystal material 28 sandwiched between the glass plates, and transparent electrodes 30 and 32 on the inside surface of the glass

plates. JA72-73 at 4:58-5:12. An ac drive signal source 13 is connected to the electrodes. JA73 at 5:2-3.

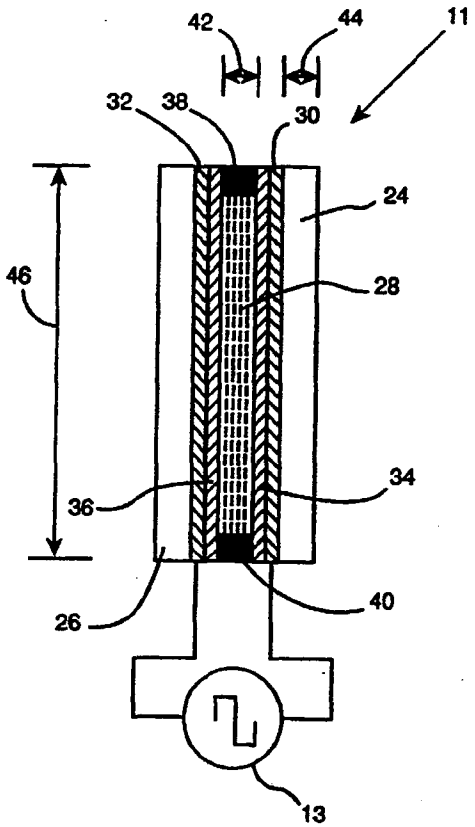

Fig. 2

The components of the ac drive signal source 13 are shown in Figure 7. JA73 at 6:66-68.

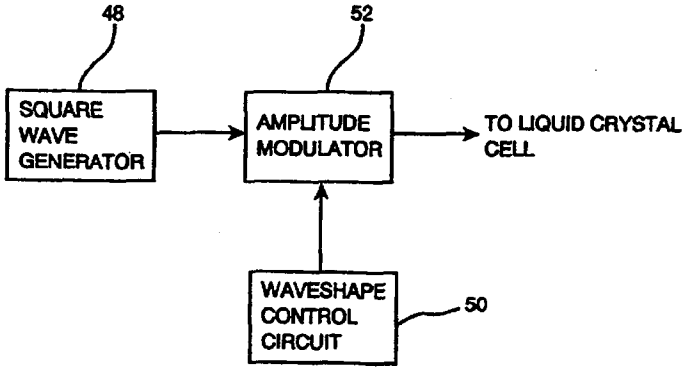

Fig. 7

The waveshape control unit 50 and amplitude modulator 52 modulate the RMS voltage of the signal produced by square wave generator 48 in order to implement "impulse switching" and produce an ac drive signal, an example of which is shown in Figure 8. JA73 at 6:2-4, JA74 at 7:4-25.

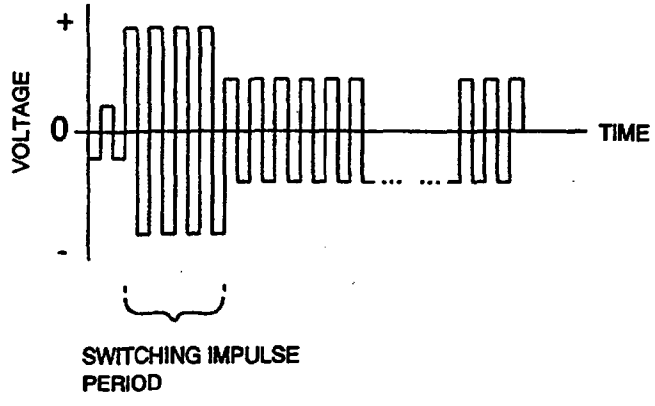

Fig. 8

The impulse switching feature is illustrated by Figures 6A through 6D. JA73 at 6:13-15.

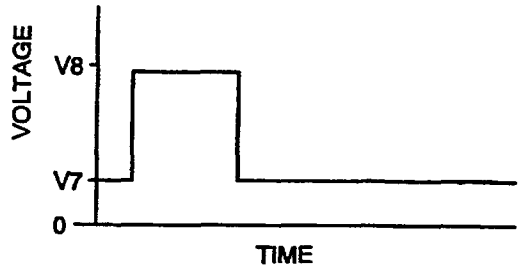

Fig. 6A

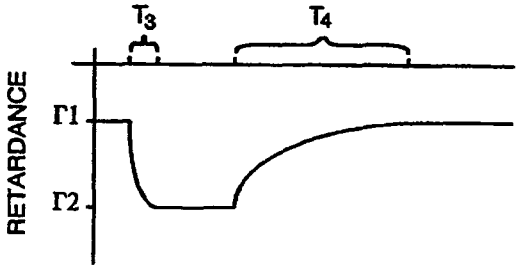

Fig. 6B

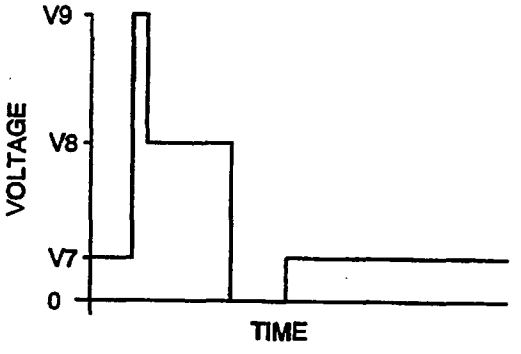

Fig. 6C

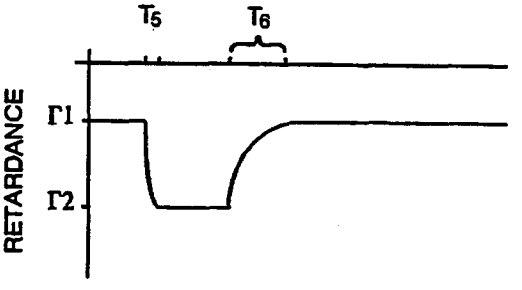

Fig. 6D

In a conventional retarder as shown in Figures 6A and 6B, when the RMS voltage changes from V7 to V8 and then back to V7, the time for the cell to switch from an

initial retardance Γ_1 to a target retardance Γ_2 is T3, and the relaxation time is T4. JA73 at 6:15-26. The invention shortens the response time to T5 by first switching to a voltage V9 higher than the voltage corresponding to the target retardance and then switching to the voltage V8 corresponding to the target retardance. JA64 at Figs. 6C & 6D, JA73 at 6:27-40. Similarly, the relaxation time is shortened to T6 by first switching to a voltage lower than that corresponding to the target retardance and then switching to the voltage V7 corresponding to the target retardance. JA64 at Figs. 6C & 6D, JA73 at 6:48-57. Although Apeldyn refers to this lower voltage as "underdrive" and to both the higher and lower voltages collectively as "overdrive," ABr. at 4 n.2, 6-7, neither term is used in the '382 patent. The general concept of impulse switching of liquid crystal displays was well known in the art prior to the invention of the '382 Patent. JA1371-72 at ¶ 76.

B. Asserted Claims

Apeldyn asserted claims 1-6, 10-11 and 20 of the '382 patent and claims 22-29 of the Reexamination Certificate. For purposes of this appeal, the asserted claims have two essential limitations. The first is expressed variously as "supplying said first signal to said first retarder means" (claim 1), "supplying a signal to said retarder to control its retardance" (claims 20, 24, 25 and 29), "supplying the signal having an ac voltage of selected amplitude to the transparent electrodes" (claims 22, 23 and 28) or "supplying the signal applied to the retarder"

(claims 26 and 27). Each of these clauses requires that a signal be supplied to a retarder or to the transparent electrodes of the retarder (the "Supplying" limitation).

The second essential limitation requires that the retardance be changed from a first retardance to a second retardance by causing the signal to change from a first amplitude (required for the first retardance) to a second amplitude (beyond that required for the second retardance) and then to a third amplitude (required for the second retardance) (the "Three Amplitudes" limitation). There are only slight and inconsequential differences in the wording of this limitation among the asserted claims.[2]

II. THE ACCUSED AUO PRODUCTS

The accused AUO products are backlit TFT-LCD panels that incorporate particular liquid crystal alignment technologies and overdrive.[3] JA639 at ¶ 27; JA660 at ¶ 84.

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[2] Although not a basis on which the district court granted summary judgment, the asserted claims also have a limitation regarding "controlling the retardance of light" as to which Apeldyn seeks to modify the district court's claim construction. As discussed below, this Court need not address the issue now (because it does not affect the summary judgment of non-infringement), if it chooses to do so the Court should reject Apeldyn's position and affirm the district court on this point.

[3] Apeldyn asserts that the accused products are "eigen-axis mode" liquid crystal cell retarders. ABr. at 9. While AUO disagrees with that characterization, it is irrelevant to this appeal.

A. Liquid Crystal Cell Structure

The accused TFT-LCD panels each comprise a pair of glass substrates with a layer of liquid crystal material sandwiched between the substrates and polarizer films. JA640 at ¶ 30, JA680 at ¶ 131. Each panel is divided into individually controllable image units, called subpixels, which are arranged in rows and columns. JA640 at ¶ 29. The inside surface of one substrate has an array of color filters and a common electrode across the entire substrate. JA640 at ¶ 30, JA680 at ¶ 132. The inside surface of the other substrate has an array of thin-film transistors (TFTs) and other circuitry that enables each subpixel to be individually controlled. JA680 at ¶ 131; JA683 at ¶ 135.

The structure of a subpixel of the accused AUO products, along with its electrical circuit, is schematically shown in the following diagram:

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JA683 at ¶ 135. As shown in the diagram, each subpixel has a thin-film transistor (TFT), a transparent pixel electrode and a storage capacitor. *Id.* The TFT acts like a switch for applying or changing the charge on the subpixel. *Id.* The electric field from the applied charge controls the orientation of the liquid crystals within that subpixel, which in turn controls the amount of polarized light that can pass through the subpixel and hence its brightness. JA663 at ¶ 91; JA683 at ¶ 135; JA688 at ¶ 145. The applied charge is stored on the storage capacitor. JA683 at ¶ 135. The stored charge maintains the electric field between the pixel electrode (on one substrate) and the common electrode (on the other substrate). *Id.;* JA688 at ¶ 145. The combination of the red, green and blue subpixels – each of varying brightness

-- forms an image on the panel. Each image is called a frame, and a series of rapidly displayed frames can create a moving picture. JA640-41 at ¶ 30; JA1950.

B. Drive Circuitry

As shown in the above circuit diagram, in each subpixel, a TFT is connected to a data line (also called a column line) and a gate line (also called a row line). The data lines carry the signal from the source driver (also called a column driver), and the gate lines carry the signal from the gate driver. JA641 at ¶ 31. The gate driver sequentially selects one row line at a time, so that all of the TFTs in that row are turned "on," allowing all of the subpixels in that row to receive the voltage signal from the corresponding data or column line. *Id.*; JA683 at ¶ 135; JA687-688 at ¶ 145; JA1951. The source drivers and gate drivers are in turn controlled by a timing controller. JA641 at ¶ 31; JA686 at ¶ 143-44.

The operation of the drive circuitry in the accused AUO products is best understood from the following diagram. Although Apeldyn's expert used this diagram to explain the operation of the accused CMO products, it is equally applicable to the accused AUO products.[4]

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[4] Dr. Kmetz's description of the accused AUO products is identical to his explanation of the CMO products based on the diagram. *Compare* JA762-64 at ¶¶ 280-81 *with* JA415-17 at ¶ 285-86. His other descriptions of the drive circuitry of the accused AUO and CMO products are also the same. *Compare* JA639-42 at ¶¶ 27-34 *with* JA294-97 at ¶¶ 27-34; *also compare* JA680-88 at ¶¶ 130-145 *with*

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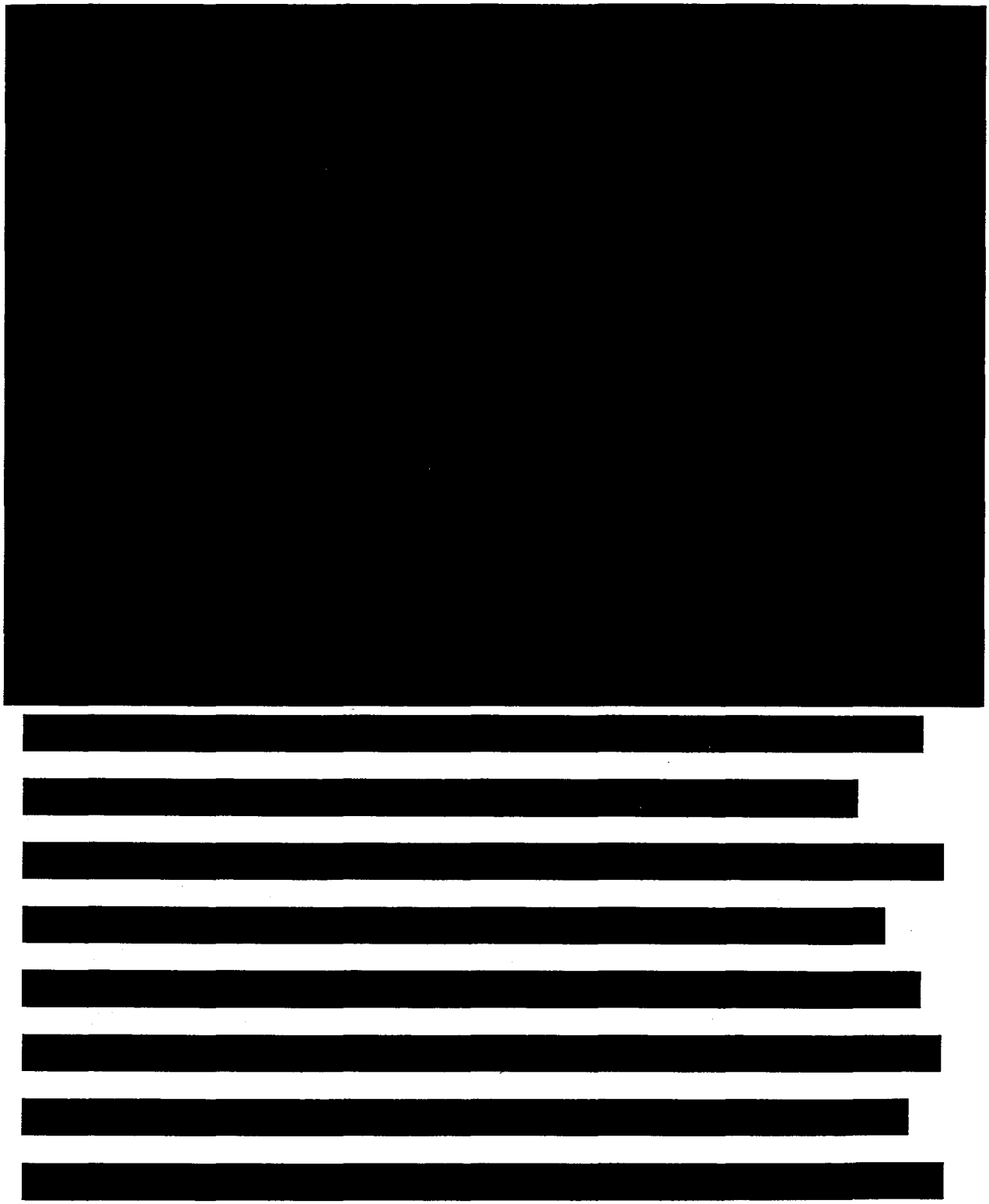

JA327-34 at ¶¶ 104-119. Apeldyn agrees that Dr. Kmetz applied the "same analysis" to the accused AUO devices as he did for the accused CMO devices. ABr. 54.

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[redacted]

Each row of TFTs is turned "on" once during each frame period, and is turned "off" during the remainder of the frame period, resulting in a pulsed data signal being supplied to each subpixel in the array. JA1951-52. The length of each pulse depends on the number of rows in the array. For example, if there are 1080 rows in the array, then each TFT is turned "on" for $1/1080^{th}$ of a frame period and is turned "off" for the remainder of the frame period. JA641 at ¶ 31.

Neither Apeldyn's appeal brief, nor its expert reports, discuss the pulsed drive signal that is supplied to each subpixel. However, it is undisputed that the sequential opening and closing of a TFT results in a pulsed signal being supplied to each subpixel, as shown by the "data line signal" in the following diagram:

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[redacted]

Apeldyn's letters to the district court concede that the signal to each subpixel is pulsed as shown in the above diagram. JA11207 (Apeldyn: the signal to each subpixel "comprises multiple pulses"); JA11354 (Apeldyn: "the only 'signals' sent to the subpixel are the so-called 'pulses' A1, A3 and A5, which are applied in successive frames").

C. Overdrive

The accused AUO products use overdrive technology to improve the response time of the liquid crystals. JA639-40 at ¶ 27; JA688 at ¶ 146. In accordance with this technology, the timing controller uses the incoming digital

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RGB data and overdrive lookup tables to determine what gray scale value (brightness level) should be applied to a subpixel when transitioning between two gray scale values (brightness levels). JA690 at ¶ 148.

In the accused products, the gray scale value for the current frame (frame N) and the gray scale value for the next frame (frame N+1) are used to look up the gray scale value that should be applied in the next frame.[5] *Id.* In general, when the gray scale value for the next frame (frame N+1) is higher than the gray scale value for the current frame (frame N), then the look-up table supplies an overdrive gray scale value that is greater than would be needed to sustain the gray scale at the same level. [redacted] Similarly, when the gray scale value for the next frame (frame N+1) is lower than the gray scale value for the current frame (frame N), then the look-up table supplies an underdrive gray scale value that is less than would be needed to sustain the gray scale at the same level. [redacted]

[5] In certain AUO products, a frame is split into two subframes: subframe N and subframe N+1. Signals are applied to subframes N and N+1 in the same fashion as signals are applied to frames N and N+1. For purposes of this appeal, the difference between the two types of overdrive has no significance.

[redacted]

The timing controller supplies the gray scale values for each subpixel to the source driver, which are supplied to each of the data lines (also called column lines) to drive the subpixels. JA687-88 at ¶¶ 144-45; JA760 at ¶ 276. The voltage applied to a subpixel corresponds to the gray scale value determined from the lookup table. JA690 at ¶ 148; JA695 at ¶ 156; JA760 at ¶ 276.

III. OPINIONS OF APELDYN'S EXPERT REGARDING INFRINGEMENT

Apeldyn's discussion of Dr. Kmetz's expert report fails to focus on the portions of the report that address the claim limitations at issue on summary judgment and this appeal. ABr. at 14-17.

A. The Supplying Limitation

As discussed above, each of the asserted independent claims (1, 20 and 22-29) requires that a signal be supplied to a retarder or to the transparent electrodes of the retarder (the "Supplying" limitation). Apeldyn's expert addressed this limitation of claim 1 in paragraphs 268-300 of his report. JA757-73 at ¶¶ 268-300. According to Dr. Kmetz, in the accused AUO products, "the thin-film transistor gates the desired amplitude onto the LCD capacitor as a sample-and-hold circuit at the beginning of each frame (i.e., periodically), which charges one of the

transparent electrodes known as the display or pixel electrode." JA762-63 at ¶ 280; JA7525:10-14. "The voltage difference between the pixel electrode and common electrode creates an electric field, which causes the liquid crystal molecules in the subpixel to change their orientation." JA763-64 at ¶ 281.

Dr. Kmetz opined that, in the accused AUO products, "the source driver, thin-film transistors, and storage capacitors working in conjunction with the timing controller and gate drivers supply the modulated AC signal to the retarder electrodes." JA772-73 at ¶ 298. Dr. Kmetz did not, however, identify what he was referring to as a "modulated AC signal," or clarify whether he was referring to the voltage difference between the electrodes or the pulsed signal to each subpixel that results from the sequential opening and closing of the TFTs.

Although Dr. Kmetz addressed (incompletely) the doctrine of equivalents with respect to the "first drive means," he did not opine that the "supplying" limitation of claim 1 was met under the doctrine of equivalents. *See* JA766-67 at ¶ 286; JA769-70 at ¶ 292; JA773 at ¶ 299. As will be discussed below, the failure to offer any doctrine of equivalents analysis with respect to the "supplying" limitation is a failure relied upon by the district court in granting summary judgment.

With respect to the Supplying limitation of claim 20, Dr. Kmetz simply opined that "[t]he driver circuitry, including the timing controller with overdrive look-up tables, source drivers, gate drivers, thin-film transistors, and storage capacitors, work collectively to identify and supply a signal to the retarder (the eigen-axis mode liquid crystal cell) to control its retardance." JA829-30 at ¶ 436; *see also* JA844-45 at ¶¶ 472-73 (addressing claim 22). With respect to the doctrine of equivalents, Dr. Kmetz provided a one-sentence conclusory opinion, without identifying any "signal" that is supplied to the retarder in the accused products. JA830-31 at ¶ 438 (claim 20—AUO's construction); JA831-32 at ¶ 440 (claim 20—CMO's construction); JA845 at ¶ 473 (claim 22). For the remaining independent claims 23-29, Dr. Kmetz simply incorporated by reference his analysis of claims 1, 20 and/or 22. *See* JA852 at ¶ 487 (claim 23); JA854 at ¶ 492 (claim 24); JA855 at ¶ 495 (claim 25); JA856 at ¶ 499 (claim 26); JA858 at ¶ 503 (claim 27); JA859 at ¶ 506 (claim 28); JA860 at ¶ 508 (claim 29).

B. The Three Amplitudes Limitation

As discussed above, each of the asserted independent claims (1, 20 and 22-29) also requires that the retardance be changed from a first retardance to a second retardance by causing the signal to change from a first amplitude (required for the first retardance) to a second amplitude (beyond that required for the second retardance) and then to a third amplitude (required for the second retardance) (the

"Three Amplitudes" limitation). Dr. Kmetz addressed this limitation of claim 1 in paragraphs 301-330 of his report. JA773-88 at ¶¶ 301-330. According to Dr. Kmetz, the claimed "first amplitude," "second amplitude" and "third amplitude" correspond to the gray scale values determined from the look-up tables in the accused AUO products, as explained in the following excerpts from his report:

> In one-frame overdrive, the starting gray-scale value for the current frame (N-1) corresponds to the first amplitude; the overdrive gray-scale value selected from the look-up table corresponds to the second amplitude; and the gray-scale value for the next frame (N) corresponds to the third amplitude when the gray-scale remains the same in the subsequent frame (N + 1).

JA782 at ¶ 317.

> In two-frame overdrive, the starting gray-scale value for the current frame (N-1) corresponds to the first amplitude; the overdrive gray-scale value selected from the first look-up table corresponds to the second amplitude; and the gray-scale value for the next frame (N) corresponds to the third amplitude.

JA782-83 at ¶ 318.

> Although these values are expressed in terms of gray-scale, they correspond to specific electric signals (voltages or amplitudes) that are applied to the subpixels.

JA783-84 at ¶ 319; *see* JA784 at ¶ 321 (addressing doctrine of equivalents).

Dr. Kmetz's infringement analysis with respect to the Three Amplitudes limitation of claims 20 and 22 is essentially the same as that for the corresponding limitation in claim 1. JA832-35 at ¶¶ 443-48 (claim 20); JA846-49 at ¶¶ 476-81

(claim 22). For the remaining independent claims 23-29, Dr. Kmetz simply incorporated by reference his analysis of claims 1, 20 and/or 22. *See* JA852 at ¶ 487 (claim 23); JA854 at ¶ 492 (claim 24); JA855 at ¶ 495 (claim 25); JA856 at ¶ 499 (claim 26); JA858 at ¶ 503 (claim 27); JA859 at ¶ 506 (claim 28); JA860 at ¶ 508 (claim 29).

C. Dr. Kmetz's Tests Of AUO Devices

Dr. Kmetz tested sample AUO products to confirm that they perform overdrive (in a general sense) and that they exhibit controlled changes in retardance. JA695-705 at ¶¶ 157-77.[6] Dr. Kmetz did not, however, rely on these tests to support his opinions that the Supplying or Three Amplitudes limitations are met by the accused AUO products. *See* JA745-46 at ¶ 242; JA821 at ¶ 416; JA821 at ¶ 436; JA829-30 at ¶ 436; JA841 at ¶ 464; JA849-50 at ¶ 483 (relying on overdrive tests to demonstrate that accused products control the retardance of the cell across a range of retardances, not to show that a signal is supplied to the retarder or that the signal has three amplitudes).

Dr. Kmetz's overdrive testing procedure involved measuring the digital video signals output from the timing controller to the source driver (column

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[6] Dr. Kmetz also conducted optical tests in attempt to show the presence or absence of eigen-axes. JA672-80 at ¶¶ 110-29. There is no contention that these optical tests are relevant to the district court's judgment and therefore should not be at issue in this appeal.

driver). JA698 at ¶ 161. In normal operation, these signals correspond to the gray scale values for each subpixel in sequence. JA687 at ¶ 144. In order to analyze the changes in amplitude from frame to frame for a single subpixel, JA988-96, Dr. Kmetz used test patterns in which every subpixel is driven to the same gray level. JA699 at ¶ 162(e) ("full-field raster video test patterns"). Dr. Kmetz did not and could not rely upon these tests to show the changes in amplitude of a signal that is supplied to a single subpixel in normal operation. Dr. Kmetz did not opine that the signals he measured are the "signals" from the claims that are supplied to the retarder to change retardance. *Id.*

IV. SUMMARY JUDGMENT PROCEEDINGS

Apeldyn omits any discussion of the parties' summary judgment submissions and wrongly accuses the district court of having misunderstood the technology and Apeldyn's arguments. Contrary to Apeldyn, the district court's understanding was accurate, and summary judgment was correctly granted based upon the admissions of Apeldyn and its expert.

A. CMO's Summary Judgment Motion

CMO argued that its accused products do not satisfy the Supplying and Three Amplitudes limitations of the claims. JA2340. According to CMO, whereas the claims require that the signal that changes retardance must have three different amplitudes, the drive signals generated to change retardance in the accused CMO

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products [redacted] JA2340-41, JA2343; *see* also JA2336-38. CMO contrasted Figure 6C of the '382 patent with a visual representation of the data line signal to a subpixel electrode in the accused CMO products, as reproduced below:

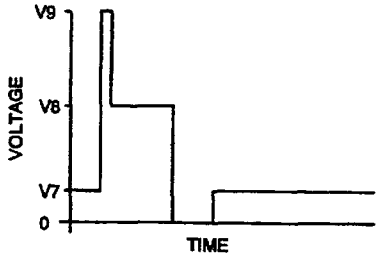

Fig. 6C [redacted]

JA2340-41. As shown in Figure 6C of the '382 patent, the signal that changes retardance changes from a first amplitude V7 corresponding to a first retardance to a second amplitude V9 to a third amplitude V8 corresponding to a second retardance. [redacted] JA2341-42. Thus, the signal supplied to the electrodes in the accused CMO products has only two amplitudes, not three amplitudes, as required by the claims. JA2341, JA2343; JA7474.

B. AUO's Summary Judgment Motion

AUO likewise moved for summary judgment of no infringement. JA3003 at 1. With respect to the claim requirement for a driving signal having three amplitudes, AUO explained that the accused AUO products function in a fundamentally different way than the claimed invention.

> The accused products are driven in a fundamentally different way than the invention of the '382 patent. Unlike the invention of the '382 patent, where there is a drive source for each liquid crystal cell and a driving signal is continuously applied to a liquid crystal cell, see '382 Patent Figs. 1 and 11, in the accused products pixels share a drive source (known as a data line) and each pixel is driven intermittently. [Kmetz] Infringement Report ¶31. In fact, most of the time any given pixel is not being driven by the driver circuits.
>
> Each pixel has a TFT that controls whether the signal on a data line is applied to the pixel. When a TFT is turned on, the signal can flow to the pixel electrode and is applied to the pixel; when the TFT is turned off, the signal on the data line is not applied to the pixel. [Kmetz] Infringement Report ¶135. Because the pixels are arranged in an array of rows and columns, there are multiple pixels attached to each data line.
>
> Therefore, it is important to only activate the TFT for that pixel when the appropriate signal is being applied to the data line.

JA3006-07. AUO further explained that, in a display having 1080 rows of pixels, each pixel is driven for only $1/1080^{th}$ of the time during which each image is displayed. JA3007-08.

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After reviewing CMO's motion for summary judgment, AUO understood that its accused products operate in the same way as CMO's and sought summary judgment on the same basis as CMO. JA7642 at n.1.

C. Apeldyn's Opposition

In response to CMO's summary judgment motion, [redacted]

In particular, with respect to the accused CMO products, Apeldyn argued:

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> [redacted] It is this ***voltage differential*** that creates the electric field that changes the orientation of the liquid crystal molecules. While the signal from the source driver is obviously related to the applied voltage, it is the applied voltage (from the stored charge) and ***not the initial pulse from the source driver*** that actually changes the retardance of the cell, as required by the claims.

JA4954 (citation omitted).

Apeldyn made the ***same admission*** regarding the accused AUO products in response to AUO's summary judgment motion:

> [redacted] It is this voltage difference, ***not the initial data signal from the source driver***, that creates the electric field across the subpixel that reorients the liquid crystal material, and hence changes the retardance and brightness levels.

JA5467-68 (citation omitted).

Rather than seeking to read the '382 patent claims on the pulsed signal that is supplied from the source drivers to the subpixel electrodes of the accused products, Apeldyn urged the district court to consider the term "signal" as referring to the voltage that is applied across the electrodes of the liquid crystal cell (or retarder). JA4954-55.

D. District Court's Summary Judgment Rulings

In granting CMO's motion for summary judgment, the district court rejected Apeldyn's argument and found there was no evidence to support infringement under a proper construction of the claims. In particular, the district court ruled:

> In order to adopt Apeldyn's infringement argument, the court would need to construe the claims to allow the retardance of the cell to be changed, not by the first "signal," but by the "applied voltage from the stored charge." (D.I. 530 at 11[JA4954]) Such a construction is not consistent with the language of the claims or the specification. (e.g., '382 patent, col. 2:14-24 [*sic,* 4:19-21] ("[T]he degree of birefringence of the cell can be controlled by control of the amplitude of the ac signal supplied by the drive signal source 12"; fig. 7 (showing an ac drive signal circuit including an amplitude modulator); fig. 8 (showing a dynamic ac voltage drive signal generated by the drive signal circuit of fig. 7)) As Apeldyn does not cite any evidence in opposition to CMO's motion demonstrating that the drive signal in CMO's products "changes" such as to effectuate the changes in amplitude and, ultimately, retardance,[9] CMO's motion for summary judgment of noninfringement is granted.

JA23-24. Footnote 9 to the district court's opinion states:

> The asserted independent claims of the '382 patent require that the three amplitudes ("changing said retardance") are achieved "by causing the [first] signal to change." During the claim construction exercise, neither Apeldyn nor CMO advocated construction of "changing" or "to change" outside of their ordinary meaning. (D.I. 487 at 5 [JA2045] (claim 1); id. at 9 [JA2049] (claim 20))

JA24 at 17 n.9. Thus, the district court construed the claims as requiring that the three amplitudes be present in a signal that is supplied to the retarder, not in the applied voltage from the stored charge. There was no evidence to support infringement under the district court's claim construction because Apeldyn failed to submit evidence demonstrating that the drive signal in CMO's products changes from a first amplitude to a second amplitude to a third amplitude, so as to effectuate a change from a first to a second retardance. JA23.

In denying Apeldyn's motion for reargument, the district court reiterated Apeldyn's failure of evidence under a proper claim construction.

> As noted in the court's prior opinion, Kmetz focuses on the ultimate voltage changes from frame to frame, not the initial signals supplied by the drive means. (D.I. 627 at 15-16[JA22-23]) Kmetz opines that CMO's overdrive circuitry and corresponding look-up tables operate to apply voltages V1, V2 and V3 at the beginning of frames 1, 2 and 3, respectively. While the amplitude from frame to frame may change, Kmetz provides no indication that the **signal supplied by the drive means** changes from a first amplitude required for the first retardance to a second amplitude and beyond a third amplitude required for the second retardance, and then back to a second amplitude required for a second retardance. ... Rather, the liquid crystal molecules change their orientation due to the voltage differential between the display and bias electrodes. (*Id.* [JA334, JA417, JA424-25]at ¶¶ 119, 286, 304)

JA46 (emphasis in original; footnote omitted).

The district court also held that Dr. Kmetz's expert report was insufficient to support a finding of infringement under the doctrine of equivalents with respect to the Three Amplitudes limitation because he failed to "articulate how the overdrive's selection of the various gray-scale values from lookup tables (for frames N-1, N, and N+1) is equivalent to changing the retardance in the cell by changing the first drive signal." JA48, citing *American Calcar, Inc. v. American Honda Motor Co., Inc.*, 651 F.3d 1318, 1338-39 (Fed. Cir. 2011) (requiring particularized testimony and linking argument as to the insubstantiality of the differences or the function, way, result test on a limitation-by-limitation basis) and JA440 at ¶ 335.

On AUO's motion for reargument, the district court found that "Kmetz's proffer with respect to AUO parallels that for CMO and, therefore, the judgment must be amended to prevent manifest injustice to AUO by allowing Apeldyn to go forward to a jury trial on legally insufficient evidence." JA49. The district court noted that Dr. Kmetz "describes the operation of the drive signals in AUO and CMO's products identically: both sets of accused products have drive signals that return to a zero amplitude between pulses." JA50 at 11, citing JA687-88 at ¶ 145 and JA334 at ¶ 119. The district court also found that Dr. Kmetz's expert report lacked particularized testimony with respect to the Three Amplitudes limitation under the doctrine of equivalents. JA51, citing JA784 at ¶ 321.

SUMMARY OF ARGUMENT

The district court correctly granted summary judgment for AUO because Apeldyn submitted ***no evidence*** that the accused AUO products meet the Supplying and Three Amplitudes limitations of the claims under a proper claim construction. The district court correctly held that the claims require that the retardance be changed by changing the amplitude of ***the signal that is supplied to the retarder***, not merely by changing the voltage across the electrodes. JA23. Both Apeldyn and its expert admitted that, in the accused products, the retardance is changed by the voltage difference across the electrodes, ***not*** by changing the amplitude of the signal supplied from the source driver to the liquid crystal cell retarder. JA4947; JA4954; JA5468; JA7523-24. Thus, Apeldyn's own arguments led to the summary judgment ruling.

Apeldyn contends that the district court made numerous claim construction errors and misunderstood the technology, ABr. 19-20, but does not address the failure of evidence that led to summary judgment. A large portion of Apeldyn's arguments are completely irrelevant to the summary judgment ruling and this appeal. To affirm the district court's judgment, this Court need only consider, ***first***, whether the district court's construction of the Supplying and Three Amplitudes limitations was correct, JA23, and ***second***, whether Apeldyn's evidence showed the presence of a ***signal*** that satisfies both the Supplying and

Three Amplitudes limitations under a proper claim construction, either literally or by equivalents. Apeldyn touches on the relevant claim construction issue, ABr. at 18, 20, 43-44, but completely skirts the evidentiary issue. As in the district court, Apeldyn fails to identify a signal in the accused products that is both: (1) supplied to a retarder, and (2) changes the retardance by changing from a first amplitude to a second amplitude and then to a third amplitude.

First, on the claim construction issue, Apeldyn argues that the district erred in concluding that applying a voltage signal "across" the retarder's electrodes is different from applying a signal "to" a retarder electrode. ABr. 18, 20. But Apeldyn itself drew this distinction, when it argued in response to CMO's summary judgment motion that "the drive signal, or voltage, of the claims refers to the voltage that is applied across the electrodes" ***not*** "the signal initially transmitted from the source driver to the thin-film transistors ..." JA4954. The plain language of the claims requires that the retardance be changed by changing a signal that is supplied "to" the retarder, not merely by changing the voltage difference "across" the electrodes. The specification is consistent with that plain meaning. *See, e.g.,* JA72 at 4:19-21 ("the degree of birefringence of the cell can be controlled by control of the amplitude of the ac signal applied by the drive signal source 12").

Apeldyn argues that, "[a]s a well understood matter of physics," the signal supplied to the retarder creates a voltage differential between the electrodes, which in turn creates an electrical field that causes the liquid crystal molecules to realign. ABr. 20. That may be true, but it does ***not*** mean that, to show infringement, it was okay for Apeldyn to ignore the signal that is supplied to the retarder and focus solely on the resulting voltage differential between the electrodes. Unlike the '382 patent's Figure 2 embodiment, in the accused products the signal supplied to the retarder does not have the same changes in amplitude as the voltage differential between the electrodes. The claims plainly require a ***signal*** that changes from a first amplitude to a second amplitude and then to a third amplitude. Therefore Apeldyn could not survive summary judgment merely by relying on changes in the voltage differential between the electrodes.

Second, on the evidentiary issue, Apeldyn argues, without citation to the record, that "[t]he signal to the retarder" in the accused devices "causes the change in retardance." ABr. at 20. This argument is directly contrary to Apeldyn's evidence and arguments in the district court. In opposition to AUO's and CMO's motions for summary judgment, Apeldyn argued:

> While ***the signal from the source driver*** is obviously related to the applied voltage, it is the applied voltage (from the stored charge) and ***not the initial pulse from the source driver*** that actually changes the retardance of the cell, as required by the claims.

JA4954 (citation omitted).

> It is this voltage difference, ***not the initial data signal from the source driver***, that creates the electric field across the subpixel that reorients the liquid crystal material, and hence changes the retardance and brightness levels.

JA5467-68 (citation omitted). Apeldyn made this argument because its expert ***never addressed*** the pulsed data signal supplied from the source driver to the retarder electrodes in the accused products. In particular, Dr. Kmetz never opined that the retardance is changed by changing a ***signal*** that is supplied to the retarder. Nor did he opine that a ***signal*** that is supplied to the retarder changes from a first amplitude (required for a first retardance) to a second amplitude (beyond that required for the second retardance) and then to a third amplitude (required for the second retardance). In fact, Dr. Kmetz admitted in deposition that the signal from the source driver does ***not*** change the retardance. JA7523-24 ("the source driver is not the thing that is control -- is driving the -- the liquid crystal").

Apeldyn's failure of evidence can be explained by a fundamental difference between the claimed invention and the accused products. The claimed invention requires that a signal be supplied to a retarder, *e.g.,* a liquid crystal cell, and that the retardance be changed by changing the amplitude of the applied signal. The accused products, on the other hand, are active matrix liquid crystal displays containing an array of more than one million subpixels, each of which can be

considered a liquid crystal cell. In order to separately control each of these subpixels, the drive signal is not supplied from the source driver directly to the electrodes. Instead, each subpixel includes a thin-film transistor (TFT) – like an on/off switch – that in its "on" position allows the drive signal to be supplied to the pixel electrode and in its "off" position allows no signal to be supplied to the pixel electrode. Whereas the drive signal to each column of subpixels is continuous (changing from an amplitude required for a first subpixel, to an amplitude required for a second subpixel, to an amplitude required for a third subpixel, etc.), the signal to each subpixel is only intermittent or pulsed. The amplitude of the pulsed signal supplied to each subpixel changes from a baseline to a first amplitude, back to the baseline, then to a second amplitude, back to the baseline, *ad infinitum*. The pulses are very short in duration, *e.g.,* only $1/1080^{th}$ of a frame period for an array of 1920 x 1080 subpixels.

Apeldyn's expert ***never addressed*** this pulsed signal that is supplied to each retarder (liquid crystal cell) in the accused products and provided ***no opinion*** that its amplitude changes from a first amplitude (required for a first retardance) to a second amplitude (beyond that required for a second retardance) to a third amplitude (required for the second retardance). Instead, he focused solely on the voltage difference that results from a charge that is stored on the pixel electrode and storage capacitor during each frame period. Thus, Apeldyn's proffered trial

evidence failed to take into account this fundamental difference between the claimed invention and the accused products and failed to identify a ***signal*** that is supplied to a retarder and that changes the retardance by changing from a first amplitude (required for a first retardance) to a second amplitude (beyond that required for a second retardance) and then to a third amplitude (required for the second retardance), as required by all of the asserted claims.

ARGUMENT

I. STANDARD OF REVIEW

This Court reviews a grant of summary judgment of non-infringement *de novo*. *O2 Micro Int'l. Ltd. v. Monolithic Power Sys., Inc.*, 467 F.3d 1355, 1369 (Fed. Cir. 2006). Notwithstanding the *de novo* standard of review, "common sense dictates that the trial judge's view will carry weight." *Dow Jones & Co., Inc. v. Ablaise Ltd.*, 606 F.3d 1338, 1345 (Fed. Cir. 2010) (citation omitted).

Because the parties do not dispute the way in which the accused AUO products function, but merely disagree over whether that undisputed functionality is covered by the asserted claims, the question of infringement is amenable to summary judgment. *General Mills, Inc. v. Hunt-Wesson, Inc.*, 103 F.3d 978, 983 (Fed. Cir. 1997) ("Where the parties do not dispute any relevant facts regarding the accused product, ... but disagree over possible claim interpretations, the question

of literal infringement collapses into claim construction and is amenable to summary judgment.")

Contrary to Apeldyn's argument, there is no issue of credibility or weight to be given to conflicting expert reports. The district court accepted Dr. Kmetz's opinions as credible and did not weigh them against any other evidence, but instead concluded they were insufficient to carry Apeldyn's burden of proof under a proper interpretation of the claims. *TechSearch, LLC v. Intel Corp.*, 286 F.3d 1360, 1373 (Fed. Cir. 2002) ("the motion of an accused infringer for judgment on the ground of non-infringement of a patent may be granted where the patentee's proof is deficient in meeting an essential part of the legal standard for infringement") (citation and quotes omitted).

II. THE DISTRICT COURT'S GRANT OF SUMMARY JUDGMENT IS BASED ON A CORRECT CLAIM CONSTRUCTION

The only claim construction relevant to this appeal is the district court's interpretation of the Supplying and Three Amplitudes limitations. JA23.[7]

Apeldyn is simply wrong when it asserts that the district court failed to construe claim 20. ABr. at 19, 41. The Supplying and Three Amplitudes limitations are included in ***every*** independent claim, and the district court's claim

[7] As discussed in Section IV below, the remainder of the claim constructions addressed in Apeldyn's brief, ABr. at 27-40, are irrelevant because they were not the basis for the district court's noninfringement ruling.

construction applies to every claim. JA23 at 16. Apeldyn effectively concedes this point by asserting that the same claim construction arguments apply to both claims 1 and 20. ABr. at 46. Moreover, any such error was invited by Apeldyn, when it told the district court that disputed terms in claim 20 do "not require separate construction." JA2048-51.

A. The District Court Correctly Held That The Claims Require That The Retardance Be Changed By Changing The Signal Supplied To The Retarder, Not By The Applied Voltage From The Stored Charge

1. The Claim Language Is Clear, And The District Court's Analysis Of It Is Correct

Each of the asserted independent claims requires that a signal be supplied to a retarder or to the transparent electrodes of the retarder (the "Supplying" limitation).[8] Each of the asserted independent claims also requires that the retardance be changed from a first retardance to a second retardance by causing the signal to change from a first amplitude (required for the first retardance) to a second amplitude (beyond that required for the second retardance) and then to a

[8] JA75 at 9:64-65 (claim 1: "supplying said first signal to said first retarder means"); JA77 at 14:12-13; JA130 at 1:34-36 and 2:16-17, JA131 at 4:19-20 (claims 20, 24, 25 and 29: "supplying a signal to said retarder to control its retardance"); JA130 at 1:36-38, and 1:63-65, JA131 at 4:2-4 (claims 22, 23 and 28: "supplying the signal having an ac voltage of selected amplitude to the transparent electrodes"); JA130 at 2:58-59, JA131 at 3:11-12 (claims 26 and 27: "supplying the signal applied to the retarder").

third amplitude (required for the second retardance) (the "Three Amplitudes" limitation).[9]

There can be no doubt but that the "signal" referenced in the Three Amplitudes limitation is the same "signal" that is supplied to the retarder (or the electrodes of the retarder) according to the Supplying limitation. A plain reading of the claims therefore requires that the retardance be changed from a first retardance to a second retardance by causing ***the signal that is supplied to the retarder*** to change from a first amplitude (required for the first retardance) to a second amplitude (beyond that required for the second retardance) and then to a third amplitude (required for the second retardance).

The district court was correct in construing the claims to require that the retardance of the cell be changed by the first signal, not by the applied voltage from the stored charge. JA23. The claims make no reference either to a stored charge or to a voltage difference across the electrodes. Rather, the claims require that the retardance be changed by changing the amplitude of a signal that is supplied to the retarder. More particularly, the claims require that the retardance

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[9] JA75 at 9:66-10:7 (claim 1); JA77 at 14:14-23 (claim 20); JA130 at 1:39-47 (claim 22); JA130 at 1:66-2:7 (claim 23); JA130 at 2:18-30 (claim 24); JA130 at 2:38-47 (claim 25); JA130 at 2:59-67 (claim 26); JA131 at 3:12-20 (claim 27); JA131 at 4:5-13 (claim 28); JA131 at 4:21-32 (claim 29); *see also* Certificate of Correction at JA78 (correcting claim 1 at col. 10, line 6).

be changed from a first retardance to a second retardance by causing the signal that is supplied to the retarder to change from a first amplitude (required for the first retardance) to a second amplitude (beyond that required for the second retardance) and then to a third amplitude (required for the second retardance).

The district court's claim construction is further supported by non-asserted claim 21, which differs from the asserted claims. Each of the asserted claims requires that the retardance be changed by changing the amplitude of a ***signal*** that is supplied to the retarder. Claim 21, on the other hand, requires that the retardance be adjusted by adjusting the amplitude of an ***electric field*** that is applied to the liquid crystal material of the retarder. JA77 at 14:39-50 (claim 21). The difference in claim language is significant and informs the proper interpretation of the Supplying and Three Amplitudes limitations in the asserted claims. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005) (en banc) ("Differences among claims can also be a useful guide in understanding the meaning of particular claim terms.") When the inventor wanted to specify changing the amplitude of the applied electric field, rather than the amplitude of the supplied signal, he did so explicitly. Non-asserted claim 21 thus reinforces the district court's conclusion that the asserted claims require that the retardance be changed by changing ***the signal supplied to the retarder***, not by changing the electric field created by the

voltage difference across the electrodes, as in the accused AUO products. *Cf.* JA763-64 at ¶ 281.

Apeldyn relies upon AUO's proposed claim constructions for the phrases, "controlling the retardance" and "control its retardance" which AUO contended should be construed to require, *inter alia,* "controlling the voltage applied across the liquid crystal cell." ABr. at 44; JA2043, 2049, and 2052. Apeldyn's reliance is misplaced. In particular, AUO's proposed constructions do not change the fact that, when read together, the Supplying and Three Amplitudes limitations require that the retardance be changed by changing the amplitude of the signal that is supplied to the retarder. The fact that AUO contended that a ***different claim term*** should be construed to require controlling the voltage applied across the liquid crystal cell does not change the proper construction of the Supplying and Three Amplitudes limitations. AUO's proposed constructions are not relevant to the proper construction of the Supplying and Three Amplitudes limitations of the claims.

Apeldyn's argument regarding "the textbook definition of voltage" is likewise irrelevant. ABr. at 45. No such definition was before the district court. Even if Apeldyn's definition were in the record, it conflicts with the claims, which require that a ***signal*** be supplied to the retarder, and that the ***signal*** have three

different amplitudes in succession. The claims nowhere refer to the voltage across the electrodes, which in the accused devices is ***not the same*** as the voltage of the signal supplied to the electrodes.

2. The Specification Supports The District Court's Construction, Not A Broadening Of The Claims Beyond Their Plain Meaning

The district court's plain meaning construction is wholly consistent with the specification. The '382 patent consistently teaches that the retardance be controlled by controlling the amplitude of the ac drive signal that is supplied to the liquid crystal cell. JA72 at 3:60-63 ("As shown in FIG. 1, a typical liquid crystal optical retarder comprises a liquid crystal cell 10 and a drive signal source 12, which supplies a relatively low voltage ac drive signal."); JA72 at 4:19-21 ("Thence, the degree of birefringence of the cell can be controlled by control of the amplitude of the ac signal applied by the drive signal source 12."); JA72 at 4:49-53 ("Since the birefringence of the cell can be controlled by controlling the amplitude of the ac signal, the amount of retardance and the polarization of the emerging light likewise can be controlled by controlling the amplitude of the ac signal.").

In Figure 1, for example, an ac drive signal source 12 supplies an ac drive signal to a liquid crystal cell 10. JA72 at 3:60-63. In Figure 2, drive signal source 13 supplies an ac drive signal to transparent electrodes 30 and 32 of liquid crystal cell 11. JA72 at 4:68-5:3, JA73 at 5:20-22. The retardance of the liquid crystal

cell is changed by changing the amplitude of the ac drive signal supplied by source 12 or source 13. JA72 at 4:19-21. An example of an ac drive signal is shown in Fig. 8, JA72 at 3:45-46, JA74 at 7:22-25, which is reproduced below with annotations to identify the three amplitudes recited in the independent claims.

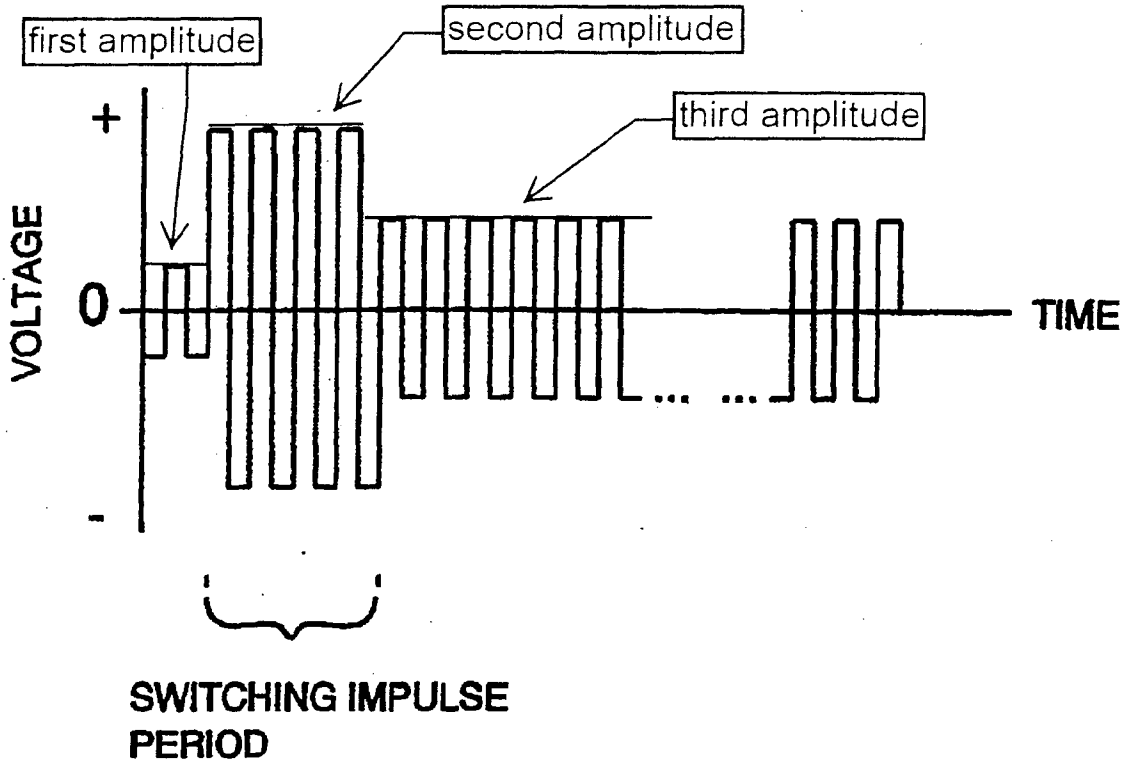

Fig. 8

As shown in Figure 8, the amplitude of an ac drive signal changes from a first amplitude (required for the first retardance) to a second amplitude (beyond that required for the second retardance) and then to a third amplitude (required for the second retardance). This change in amplitude of the ac drive signal results in a

change in retardance of the liquid crystal cell. JA72 at 4:49-53. Similarly, Figure 6C shows the RMS voltage of a drive signal having three amplitudes. JA782 at 3:36-38. Nothing in the '382 patent suggests that the "impulse switching" concept could be implemented without supplying a signal having three successive amplitudes, as shown in Figures 6C and 8.

Nothing in the specification supports that claimed "signal" that is supplied to the retarder and has three successive amplitudes is synonymous with the voltage across the electrodes. On the contrary, the specification teaches that the three amplitudes can be generated by signals having various waveforms, duty cycles and peak voltages, JA73 at 5:20-33, thus reinforcing that the claimed "signal" is not the same thing as the voltage across the electrodes.

Apeldyn relies upon Figure 2 of the '382 patent to argue the phrases "signal to" and "voltage difference across" "amount to the same thing," ABr. 43, and "there is no distinction between applying a signal across the electrodes of the retarder and applying a signal 'to the retarder.'" ABr. 44. There is no evidentiary support for Apeldyn's argument, nor does it support construing the claims contrary to their plain meaning.

Apeldyn's expert report does not even address Figure 2 of the '382 patent. In Figure 2, the "signal" referred to in the Supplying and Three Amplitudes

limitations of the claims is the signal that is supplied by ac drive signal source 13 to the transparent electrodes 30 and 32. JA72 at 4:68-5:3. The voltage difference across electrodes 30 and 32 -- *i.e.,* the electrical potential between the two electrodes – is not being supplied "to" the electrodes.

Consistent with the specification and the district court's claim construction, CMO's expert, Dr. Yeh, stated that Figure 2 "shows a voltage source that supplies a voltage ***to*** the electrodes of the retarder," JA1964, not the voltage across the electrodes, as argued by Apeldyn. *Cf.* ABr. 43. Moreover, even if the signal supplied to electrodes 30 and 32 by ac drive signal source 13 in Figure 2 were the same as the voltage difference across the electrodes, that would not support construing the claims as covering circuits in which the drive signal supplied "to" the retarder electrodes is ***not*** the same as the voltage differential across the electrodes. The plain language of the claims requires that the retardance be changed by changing the amplitude of a signal supplied ***to*** the retarder (or the electrodes of the retarder), not merely by changing the voltage difference ***across*** the electrodes.

B. Apeldyn Waived Any Argument That The District Court's Grant Of Summary Judgment Was Based On An Erroneous Claim Construction

Apeldyn's claim construction – that the phrases "signal to" and "voltage difference across" "amount to the same thing," ABr. at 43 – is proposed for the

first time on appeal.[10] Before the district court, Apeldyn failed to propose any claim construction for the Supplying or Three Amplitudes limitations. Apeldyn contended that the phrase, "supplying a signal to said retarder to control its retardance" in claim 20 "[d]oes not require separate construction apart from the terms identified by Apeldyn." JA2050. The only terms in this phrase for which Apeldyn proposed constructions were "control its retardance" and "retarder." JA2049-50. Similarly, Apeldyn contended that the terms, "amplitude," "third amplitude," "beyond a third" should have their "ordinary meaning" and "does [*sic*] not require construction." JA2050.

Following the grant of summary judgment for CMO, Apeldyn never challenged the district court's claim construction requiring that the retardance of the liquid crystal cell be changed by a signal that is supplied to the retarder, not by the applied voltage from the stored charge. JA23. In fact, Apeldyn argued that the infringement question is ***not*** an issue of claim construction and "there's nothing that needs to be done with the Court's claim construction with respect to this issue." JA11254:11-13; *see also* JA11222-223:22-6:3; JA11233:13-17. Instead,

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[10] Pursuant to the district court's scheduling order, Apeldyn was required to identify, during the claim construction phase of the case, any claim language having a meaning to a person of ordinary skill in the art that differs from the ordinary meaning. *Apeldyn Corp. v. AU Optronics Corp.*, No. 08-568-SLR, docket no. 59,¶ 7 (D. Del. March 9, 2009) (Scheduling Order).

Apeldyn focused solely on the sufficiency of the evidence under the district court's claim construction. *See* JA11205; JA11350.

Apeldyn previously recognized the distinction between the claimed signal and the resulting applied voltage. In opposition to CMO's motion for summary judgment, Apeldyn conceded that "the signal from the source driver is obviously ***related to*** the applied voltage..." but the applied voltage ***is not*** the signal. JA4954. Apeldyn again distinguished the applied voltage from the signal supplied to the retarder in its opposition to AUO's motion for summary judgment: "It is this voltage difference, ***not the initial data signal*** from the source driver, that creates the electric field across the subpixel that reorients the liquid crystal material, and hence changes the retardance and brightness levels." D.I. 532. Likewise, Dr. Kmetz never opined that the voltage difference across the electrodes ***is*** the signal required by each of the independent claims to be supplied to the retarder. *See, e.g.*, JA683 at ¶ 135; JA687-88 at ¶ 145; JA763-64 at ¶ 281.

Accordingly, by failing to argue before the district court that the phrases "signal to" and "voltage difference across" mean the same thing, ABr. at 43, Apeldyn waived the right to seek that claim construction on appeal. *Sage Prods., Inc. v. Devon Indus., Inc.*, 126 F.3d 1420, 1426 (Fed. Cir. 1997) ("[A]ppellate courts do not consider a party's new theories, lodged first on appeal.... In short,

this court does not 'review' that which was not presented to the district court.") For this reason alone, this Court should not disturb the district court's claim construction.

III. APELDYN PRODUCED NO EVIDENCE THAT THE ACCUSED AUO PRODUCTS SATISFY THE SUPPLYING AND THREE AMPLITUDES LIMITATIONS OF THE CLAIMS, EITHER LITERALLY OR BY EQUIVALENTS

A. Apeldyn Proffered No Evidence That Would Support A Finding Of Literal Infringement Under A Correct Construction Of The Claims

Under the district court's correct construction of the Supplying and Three Amplitudes limitations of the claims, no reasonable jury could find that the accused AUO products literally infringe the '382 patent.

Apeldyn's expert confined his infringement opinion to an improper construction of the claims. In particular, Dr. Kmetz's opinions are based entirely on a claim construction that replaces the term "signal" with "voltage difference between the electrodes." That claim construction is incorrect, and Apeldyn failed to submit any evidence supporting infringement under a correct construction.

Apeldyn submitted no evidence that, in the accused AUO products, the retardance is changed from a first retardance to a second retardance by changing a signal that is supplied to the retarder, as required by the claims. Instead, according to Apeldyn's expert, the retardance in the accused AUO products is changed by changing the electric field created by ***the voltage difference between the pixel***

electrode and common electrode, which results from a charge stored on the storage capacitor. JA683 at ¶ 135 ("the charge is stored on the storage capacitor, which in turn, drives the pixel electrode that creates the electric field for reorienting the liquid crystal molecules"); JA688 at ¶ 145 ("The voltage difference between the pixel electrode and common electrode creates an electric field, which causes the liquid crystal molecules to change their orientation."); JA753-54 at ¶ 261 (same); JA763-64 at ¶ 281 (same); JA826 at ¶ 427 (same). Although Apeldyn now attempts to argue that the accused devices "**do** apply signals to the pixel retarder electrode to change retardance," ABr. at 45 (emphasis in original), it cites ***no evidence*** to support that contention.

When addressing the accused AUO products, Apeldyn and its expert failed to identify a ***signal*** that is supplied to a retarder (or to the electrodes of the retarder) and that changes from a first amplitude (required for the first retardance) to a second amplitude (beyond that required for the second retardance) and then to a third amplitude (required for the second retardance). In particular, Dr. Kmetz opined that the claimed "first amplitude," "second amplitude" and "third amplitude" correspond to the gray scale values determined from the look-up tables in the accused AUO products. JA782-83 at ¶¶ 317-18. Although Dr. Kmetz opined that the gray-scale values "correspond to specific electric signals (voltages or amplitudes) that are applied to the subpixels," JA783 at ¶ 319, he failed to

Confidential Material Redacted

identify any ***signal*** that changes from a first amplitude to a second amplitude and then to a third amplitude, as required by the claims.

Apeldyn's failure of proof is easily explained. ***There is no such signal in the accused AUO products.*** It is undisputed that the drive signal supplied to a subpixel in the accused AUO products is a pulsed signal, with one pulse per frame. JA11354 ("the only 'signals' sent to the subpixel are the so-called 'pulses' A1, A3 and A5, which are applied in successive frames"); JA7526; JA11207. This pulsed signal changes from a baseline amplitude to a first amplitude (the desired amplitude for that frame) and then back to a baseline amplitude, as shown by the following undisputed figure:

JA2340-41; *see also* JA687-88 at ¶ 145 ("the thin-film transistor gates the desired amplitude onto the LCD capacitor as a sample-and-hold circuit at the beginning of each frame (i.e., periodically), which charges one of the transparent electrodes

known as the display or pixel electrode"); JA762-63 at ¶ 280 (same); JA809 at ¶ 385 (same); JA7524:10-14. ***These are not the amplitudes referred to in the claims, nor has Apeldyn's expert ever so contended.***[11]

Apeldyn's failure of evidence is not cured by its arguments on appeal. Apeldyn contends that "Dr. Kmetz gave a detailed description of how AUO's accused devices deliver a signal to the retarder," identifying the signal from the source driver and the gated amplitude from the thin-film transistors. ABr. at 45. As noted in the preceding two paragraphs, however, there is no expert testimony or other evidence supporting that either of these signals changes the retardance by changing from a first amplitude to a second amplitude and then to a third amplitude. Apeldyn simply failed to submit evidence sufficient to permit a jury to find literal infringement under a proper construction of the claims.

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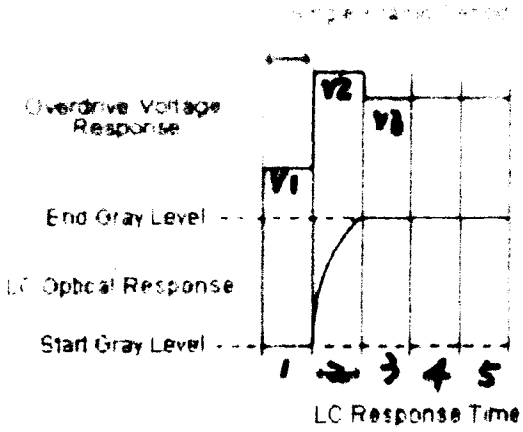
[11] The drive signal sent by a column or source driver in the accused AUO products changes from a first amplitude (required for a subpixel in a first row) to a second amplitude (required for a subpixel in a second row), and so on ad infinitum, until all of the subpixels in the column have been refreshed. JA415-16 at ¶ 285; JA7525:19-24; see p. 16, supra. Neither Apeldyn, nor its expert, ever attempted to read the Supplying or Three Amplitudes limitations on the continuous signal supplied by a column or source driver to a column of subpixels in the accused AUO products.

Contrary to Apeldyn's argument, ABr. at 12, neither AUO nor CMO "exploited" the term "source driver" to confuse the district court. The district court focused on the signal supplied to the retarder, not the signal from the source driver, and correctly granted summary judgment against Apeldyn.

Apeldyn also relies upon the following illustration of CMO's overdrive process:



ABr. at 10, citing JA436-7 at ¶ 329. Dr. Kmetz agreed that this illustration shows "overdrive voltage response versus LC response time." JA7523:16-18; *see also* JA1971 at ¶ 97. He further testified that the voltage depicted in this illustration is "the voltage across the liquid crystal retarder." JA7523:19-23. Dr. Kmetz never contended, either in his expert report or his deposition, that the above illustration shows the amplitude of a signal that is supplied to the retarder. JA436-37 at ¶ 329; JA7523-24. Accordingly, the illustration that is the cornerstone of Apeldyn's infringement evidence has ***no relevance*** under a correct construction of the claims, which requires that the signal supplied to the retarder have three amplitudes in succession, not merely that the voltage across the liquid crystal retarder have three amplitudes.

B. Apeldyn And Its Expert Admitted That, In The Accused AUO Products, The Retardance Is Not Changed By Changing The Signal Supplied To The Retarder, As Required By The Claims

Affirmance of the district court's judgment is made particularly easy in this case because Apeldyn and its expert essentially admitted that there is no infringement under a correct reading of the claims. In response to defendants' summary judgment motions, Apeldyn conceded that, in the accused CMO and AUO products, the retardance is ***not*** changed by the ***signal*** from the source driver, but is instead changed by the ***voltage difference*** across the electrodes that results from a charge stored on the storage capacitor. In particular, with respect to the accused AUO products, Apeldyn admitted:

> It is this voltage difference, ***not the initial data signal from the source driver***, that creates the electric field across the subpixel that reorients the liquid crystal material, and hence ***changes the retardance*** and brightness levels.

JA5468; *see also* JA4947 and JA4954 (conceding that, in the accused CMO products, the pulsed signal transmitted from the source driver to the subpixels is not what causes the retardance to change).

Apeldyn further admitted that, in accused products, the pulsed signal from the source driver does not have the three amplitudes required by the asserted claims. JA4947-48 ("It is this sequence of voltages (represented by gray-scale

values), ***not the original pulses from the source driver***, that correspond to the three amplitudes in claims 1, 20, and 22-29.")

Apeldyn's concessions are consistent with the deposition testimony of its expert. Dr. Kmetz admitted that, in the accused devices, "***the source driver is not the thing that is control -- is driving the -- the liquid crystal.***" JA7524:2-4. Dr. Kmetz relied upon an incorrect claim construction, contending that "***what we're supposed to be measuring [is] the voltage across the liquid crystal.***" JA7524:13-14. Instead of identifying a signal that is supplied to the retarder and that has three amplitudes, as required by the claims, Dr. Kmetz only considered the voltage across the liquid crystal. JA7524:2-14.

Accordingly, the district court did not err in granting summary judgment against Apeldyn based on its own admissions and those of its expert.

C. Apeldyn Submitted No Particularized Testimony Supporting Infringement Of The Supplying And Three Amplitudes Limitations Under The Doctrine Of Equivalents

The "essential inquiry" in any determination under the doctrine of equivalents is whether "the accused product or process contain[s] elements identical or equivalent to each claimed element of the patented invention." *Warner-Jenkinson Co., Inc. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 40 (1997). This analysis must applied on an element-by-element basis. *Id.* at 29.

To avoid a grant of summary judgment of non-infringement by equivalents, a patentee must provide particularized testimony and linking argument as to the insubstantiality of the differences between the claimed invention and the accused device or process, or with respect to the function, way, result test. Such evidence must be presented on a limitation-by-limitation basis. *Am. Calcar, Inc. v. Am. Honda Motor Co.*, 651 F.3d 1318, 1338-39 (Fed. Cir. 2011); *Texas Instruments, Inc. v. Cypress Semiconductor Corp.*, 90 F.3d 1558, 1567 (Fed. Cir. 1996).

Here, the district court correctly granted summary judgment of no infringement under the doctrine of equivalents "[b]ecause [Apeldyn's expert] Kmetz did not provide particularized testimony describing his doctrine of equivalents theory on a limitation-by-limitation basis, and provided only conclusory testimony with respect to the function-way-result test." JA51. With respect to the Supplying and Three Amplitudes limitations, Dr. Kmetz provided no particularized testimony as to the insubstantiality of the differences between: (1) changing the retardance by supplying a signal to the retarder that changes from a first to a second to a third amplitude, as recited in the Supplying and Three Amplitudes limitations of the claims, and (2) changing the retardance by varying the voltage across the electrodes that results from a charge stored on a storage capacitor, as in the accused AUO products. Dr. Kmetz's expert report fails even to acknowledge the difference between these two ways of changing the retardance,

much less to analyze the substantiality of those differences in the context of the '382 patent.

With respect to the Three Amplitudes limitation, the entirety of Dr. Kmetz's doctrine of equivalents analysis is as follows:

> To the extent it may be argued that there is no literal infringement, this limitation is satisfied under the doctrine of equivalents because AUO's one-frame overdrive and two-frame overdrive both perform substantially the same function as the claim limitation (driving from a first to a second retardance, expressed in terms of gray-scale values) in substantially the same way (applying a voltage higher or lower than that which corresponds to the second gray-scale, or retardance, value) to achieve substantially the same result (faster response time).

JA784 at ¶ 321; *see also* JA835 at ¶¶ 447, JA848-49 at ¶ 480 (same). In connection with the foregoing expert opinion, the district court correctly observed: "Kmetz does not articulate how either of AUO's overdrive selection of the various gray-scale values from look-up tables is equivalent to changing the retardance in the cell by changing the drive ***signal***. There is no foundation for Apeldyn's position that AUO infringes as long as the ***voltage*** (carried along by the storage capacitor) varies from frame to frame." JA50 (emphasis in original).

Because they rely upon the so-called triple identity test, Apeldyn and its expert were required to identify a compare the function, way and result of the

Supplying and Three Amplitudes limitations with the function, way and result of AUO's drive circuitry and overdrive operations, and offer evidence that they perform substantially the same function in substantially the same way, to achieve substantially the same result. *Am. Calcar*, 651 F.3d at 1338-39. Neither Apeldyn nor Dr. Kmetz made any such comparison.

With respect to the Supplying limitation, Dr. Kmetz made no analysis whatsoever comparing the signal that is supplied to the retarder in accordance with the claim with any signal in the accused AUO products. Dr. Kmetz simply ignored this difference in function, way and result. *Miken Composites, LLC v. Wilson Sporting Goods Co.*, 515 F3d 1331, 1341 (Fed. Cir. 2008) (affirming summary judgment of non-infringement, where patentee "provided 'no particularized testimony from an expert or person skilled in the art that (a) specifically addressed equivalents on a limitation-by-limitation basis; (b) explained the insubstantiality of the differences between the patented method and the accused product; or (c) discussed the function, way, result test'") (*quoting AquaTex Indus., Inc. v. Techniche Solutions*, 479 F.3d 1320, 1329 (Fed. Cir. 2007)) (brackets omitted from internal quote).

With respect to the Three Amplitudes limitation, Dr. Kmetz never identified the ***way*** that the retardance is changed from a first retardance to a second

retardance in accordance with the Three Amplitudes limitation of the claim. Instead, Dr. Kmetz identified ***only one way*** – "(applying a voltage higher or lower than that which corresponds to the second gray-scale, or retardance, value)," JA784 at ¶ 321 – and made ***no comparison*** between the ***accused way*** and the ***way that is recited in the claims*** to determine whether they are substantially the same. This failure of proof dooms Apeldyn's reliance on the doctrine of equivalents. *Texas Instruments*, 90 F.3d at 1568 (no DOE infringement where expert testimony provided "no discussion of whether or how the way the [accused device] operates [was] similar to the patent claim" (quotation and citation omitted)).

Apeldyn's brief is likewise void of any particularized argument regarding the doctrine of equivalents with respect to the Supplying and Three Amplitudes limitations. With respect to claim 20, Apeldyn's analysis is confined to a single footnote, with no citations to the record. ABr. at 45 n.10. With respect to claim 1, Apeldyn argues that Dr. Kmetz's report created an issue of fact as to whether the "drive means" is met under the doctrine of equivalents, ABr. at 56-59, but none of the cited paragraphs specifically addresses the Supplying or Three Amplitudes limitations or provides particularized testimony as to the insubstantiality of the differences or function, way result test. *Id.,* citing JA644-46, JA663, JA683, JA687-88, JA702-07, JA766-67, JA794, JA801 at ¶¶ 41-46, 90, 135, 138, 144, 145, 171-177, 180-183, 286, 343, 362. Of these, only paragraph 186 quoted above

even addresses the "drive means" under the doctrine of equivalents. Dr. Kmetz's conclusory opinion regarding the "drive means" fails to present a triable issue of fact as to whether the Supplying or Three Amplitudes limitations are met under the doctrine of equivalents.

Finally, Apeldyn cites Dr. Kmetz's overdrive tests to argue that "[t]he accused devices use overdrive and thus achieve the same result as the patented invention." ABr. at 60. Apeldyn's argument oversimplifies the claims of the '382 patent, which require more than merely the use of three-amplitude overdrive. The claims require changing the retardance by supplying a signal to the retarder that changes from a first amplitude to a second amplitude and then to a third amplitude. Summary judgment was properly granted against Apeldyn because it failed to identify any such signal or its equivalent in the accused devices.

IV. THE REMAINING CLAIM CONSTRUCTION ISSUES RAISED IN APELDYN'S BRIEF ARE IRRELEVANT AND SHOULD NOT BE ADDRESSED

Apeldyn challenges the district court's claim constructions for the terms "first retarder means ...", "eigen-axes," and "first drive means" and "first control means" in claim 1, "means for reducing ..." in claim 10, and "means for aligning ..." in claim 11. ABr. at 27-40. Apeldyn concedes that the construction of "eigen-axis" is not material to the district court's disposition on summary judgment, ABr. at 33 n.8, and makes no argument that any of its other proposed claim

constructions would affect the judgment. In fact, Apeldyn's infringement arguments rely on the district court's claim constructions for "first retarder means," "first drive means" and "first control means," not Apeldyn's proposed construction. ABr. at 47, 49-52, 56-58. The remaining claim constructions are not even mentioned in the context of Apeldyn's infringement arguments.

Apeldyn conceded that the district court's constructions for the above claim terms were not the basis for the judgment below. In seeking reconsideration of the district court's November 15, 2011 summary judgment ruling in favor of CMO, Apeldyn did not seek any of the modifications to claim construction it now seeks.[12] JA11222-23:22-6:3; *see also* JA11254:11-13; JA11233:13-17.

In seeking a construction for "controlling the retardance of light," Apeldyn admits (and complains) that the district court did not construe the phrase. ABr. at 29. Absent an agreement of the parties, this Court has consistently declined to construe terms in the first instance. *Wavetronix LLC v. EIS Elec. Integrated Sys.*, 573 F.3d 1343, 1355 (Fed. Cir. 2009) (citing cases). And in any event, Apeldyn's proposed construction improperly reads a limitation into the claims based solely on the specification's description of prior art, JA71 at 1:45-48, JA71 at 1:61-2:3, and a

[12] While the district court later made slight modifications to a few of its claim constructions, the errors alleged in Apeldyn's brief are based on the district court's original constructions, which Apeldyn conceded were not relevant to the summary judgment issue. JA11222-23 at 5:22-6:3.

description of a ***some*** of the preferred embodiments. JA73 at 6:62-65. Apeldyn's construction would improperly exclude other embodiments, such as a fiber-optic communications link, JA72 at 3:5-6, in which the retardance is switched between only two values, rather than "between intermediate values over a range of retardances." ABr. at 29. An example of such an embodiment is Figure 6D, where the device switches between an initial retardance $\Gamma 1$ and a target retardance $\Gamma 2$. JA64 at Fig. 6, JA73 at 6:21-40. Accordingly, although it was not the basis for the summary judgment ruling, the district court correctly refused to adopt Apeldyn's proposed construction.[13]

Accordingly, the record is clear that Apeldyn's claim construction issues are outside the scope of the district court's judgment and therefore not presented to this court on appeal. *Engel Indus., Inc. v. Lockformer Co.*, 166 F.3d 1379, 1382 (Fed. Cir. 1999) ("The scope of the issues presented to this court on appeal must be measured by the scope of the judgment appealed from ... not by the arguments

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[13] With respect to the term "eigen-axis," Apeldyn seeks modifications of the district court's construction, without addressing the core issue of whether an "eigen-axis" is a property of a liquid crystal molecule (AUO's position) or a liquid crystal cell (Apeldyn's position), which was hotly disputed in the district court. *Compare* ABr. 32-33 *with* JA3445-448; JA7786-791. Apeldyn's brief completely ignores this fundamental and complex issue, providing yet another reason for this Court to refrain from delving into these ancillary claim construction issues. In the event of a remand, AUO reserves the right to argue in favor of its own proposed construction for "eigen-axis," which was rejected by the district court, but is not material to the district court's judgment and is not addressed by Apeldyn's appeal brief.

advanced by the appellant.") (citations omitted). Because no concrete controversy would be resolved by addressing these claim construction issues, this Court should decline to consider them. *Fresenius USA, Inc. v. Baxter Int'l, Inc.*, 582 F.3d 1288 (Fed. Cir. 2009) ("Fresenius gave this court little guidance and cited no record support regarding why a modified claim construction would affect the infringement judgment, the validity judgment, or both. For that reason alone, we may decline to consider Fresenius's claim construction arguments."); *Jang v. Boston Scientific Corp.*, 532 F.3d 1330, 1336 (Fed. Cir. 2008) ("The Supreme Court has explicitly held that Article III does not permit the courts to resolve issues when it is not clear that the resolution of the question will resolve a concrete controversy between interested parties.")

V. CONCLUSION

For all of the foregoing reasons, the district court judgment should be affirmed.

Respectfully submitted,

Dated: December 5, 2012

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PROOF OF SERVICE

I, Keisha Montero, declare:

I am a citizen of the United States and employed in Los Angeles, California. I am over the age of eighteen years and not a party to the within-entitled action. My business address is 601 South Figueroa Street, Los Angeles, California 90017. On December 5, 2012, I served the required number of copies of the within document(s):

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Keisha Montero

CERTIFICATE OF COMPLIANCE

Counsel for Defendants –Appellees AU Optronics Corporation and AU Optronics Corporation America certifies that the foregoing brief complies with the type-volume limitations of the Federal Rules of Appellate Procedure 32(a)(7)(B). According to the word count of the word-processing system used to prepare this brief, there are 13,658 words in this brief pursuant to the Court's rules of counting.

Dated: December 5, 2012

Terry D. Garnett